

Birds of Seal Rocks in northern Bass Strait over 40 years (1965–2005)

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Abstract

Long-term datasets of fauna are rare for uninhabited islands in south-eastern Australia. Here we report on 40 years of observations from 1965 to 2005 on the birds of Seal Rocks in northern Bass Strait. Seventy-five native and six exotic species including 21 native passerines were observed at Seal Rocks or nearby. Six species were recorded breeding—Crested Tern *Thalasseus bergii*, Silver Gull *Chroicocephalus novaehollandiae*, Sooty Oystercatcher *Haematopus fuliginosus*, Welcome Swallow *Hirundo neoxena*, Common Starling *Sturnus vulgaris* and, for the first time in Victoria, Kelp Gull *Larus dominicanus*. The main changes to breeding birds over the 40 years have been the movement and expansion of the breeding colonies of Crested Terns and Silver Gulls to adjacent parts of nearby Phillip Island, and the arrival and expansion of the breeding Kelp Gull population. Kelp Gulls have increased substantially at Seal Rocks since their arrival in 1968. The first reported breeding for Victoria occurred there in 1971. The expansion of Kelp Gulls may have been associated with the expansion of Australian Fur Seal *Arctocephalus pusillus doriferus* numbers which, on one hand, has reduced the number of suitable breeding sites but, on the other hand, has increased the amount of food available in the forms of vomited food remains and placentae. The variety of land birds recorded on Seal Rocks was surprisingly high, given the exposed nature and relative sterility of the terrain; however, the strait between Seal Rock and Phillip Island is narrow and all the species recorded there are common in the region and most are wide-ranging seasonally or undertake significant north-south migrations. Records were relatively few after 1997 due, in part, to the reduced amount of vegetation on the islets and greatly reduced lengths of research stays. (*The Victorian Naturalist* 130 (1) 2013, 4–21).

Key words: Seal Rocks, Phillip Island, birds, long-term survey

Introduction

Seal Rocks (38° 32' S, 145° 06' E), a State Faunal Reserve, comprises two small islets—Seal Rock and Black Rock—which lie about 1.5 km off the south-west point of Phillip Island, Victoria (Fig. 1). Seal Rock, the larger islet, includes two detached rocks to the north-west and an extensive area of low-lying reef to the east, which is cut off at high tide (Fig. 2). The total land area is about 2.8 ha.

Although Seal Rocks has had a long history of visits by Europeans dating from 1801 (Warneke 1982, 2003), very few detailed accounts survive and none provide any useful information on the vegetation or bird life. This paper reports on incidental sightings and observations on birds ashore and at sea around the islets, accumulated during a program of research on the resident colony of Australian fur seals *Arctocephalus pusillus doriferus*, by Robert Warneke (1965–1991) and continuing studies there on fur seals and birds by Roger Kirkwood (RK) and Peter Dann (1998–2005). Datasets of such duration are rare, particularly for uninhabited islands in south-eastern Australia.

Field studies were initiated in 1965 by the Fisheries and Wildlife Department (now the Department of Sustainability and Environment) and supported until 1979. A field station was built on the southern plateau of Seal Rock in the summer of 1965–1966 (Warneke 1966) and subsequently other structures were erected to facilitate aspects of the project including a flying-fox connecting the two islets (1967), a small observation hide on each of the Seal Rock plateaux (1967) and a 15 m steel observation tower adjacent to the station (1969). Most of this infrastructure was demolished by 1979 when a second field station was built out of rock at the base of the northern end of South Plateau.

A small research team visited Seal Rocks at approximately monthly intervals from 1966 until 1972, but thereafter visits were limited to November and December each year to monitor events during the breeding season and to count pups. Pups were routinely marked each January until 1977. From 1979 to 1991 RMW continued the November–December monitor-

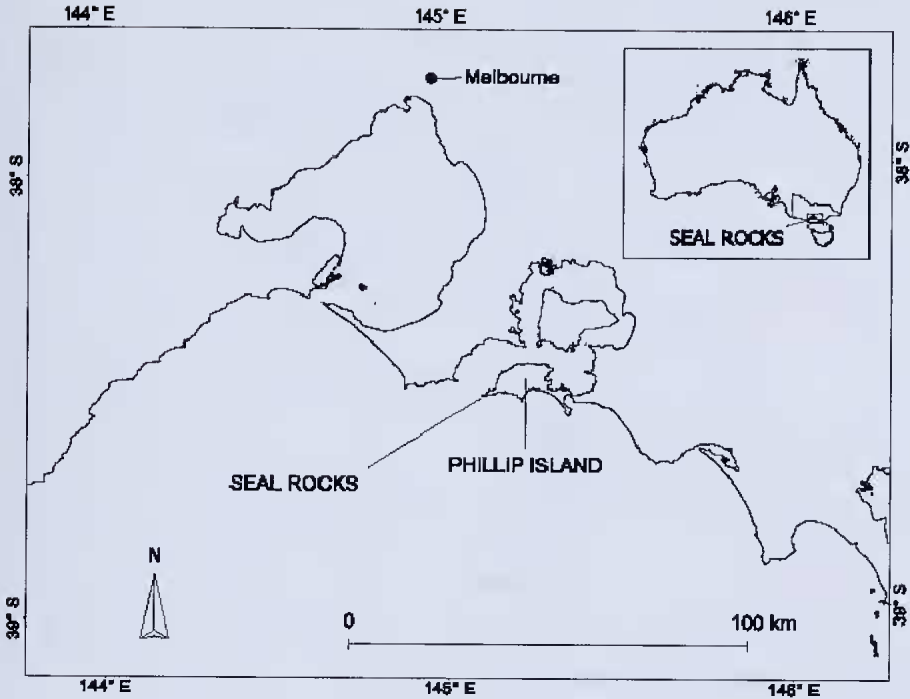


Fig. 1. Locations of Seal Rocks and Phillip Island in Bass Strait, south-eastern Australia

ing and counting on a private basis until, by 1991, very few marked animals remained alive (Warneke 2003). More recently, Seal Rock has been visited on 40 occasions between February 1997 and April 2005 by PD and RK. Most visits were of several hours' duration but several trips lasted 3–4 days while satellite transmitters were deployed on fur seals (Kirkwood *et al.* 2005).

Opportunities for observation were constrained by the demands of the seal study, and although 'new' or rarely seen species and significant activities were always duly noted, observations on resident species were not systematically recorded. Visits to many parts of Seal Rock were consciously limited, to avoid disturbing the seals, and extra care was taken when birds were nesting; visits to check the contents of particular nests were cautious and brief. Landings on Black Rock were difficult and risky until the flying fox was in place, but even then that islet was visited only for specific tasks such as tagging seal pups.

The data accumulated under these circumstances, especially during the most intense period of seal research from 1966 to 1972, provide a fairly clear picture of bird diversity on the islets, including the occurrence of seasonal migrants. Most observations were made with the aid of Zeiss 8 x 30 binoculars, and frequently an 800 mm telescope was used for closer viewing of a particular bird or activity. The effective visual range was usually about 1 km for large seabirds or congregations, and as far as 3 km in clear weather using the telescope. Observational effort differed between the period of intense seal research (1966–1972) and the later years (1997–2005). These are referred to hereafter as the first and second survey periods respectively. Bird observations in the later years were confined to the islets and waters immediately adjacent, using 10 x 20 binoculars; consequently, many fewer pelagic seabirds were recorded.

Records of birds summarised here consist of notes in RMW's field journals, to which all

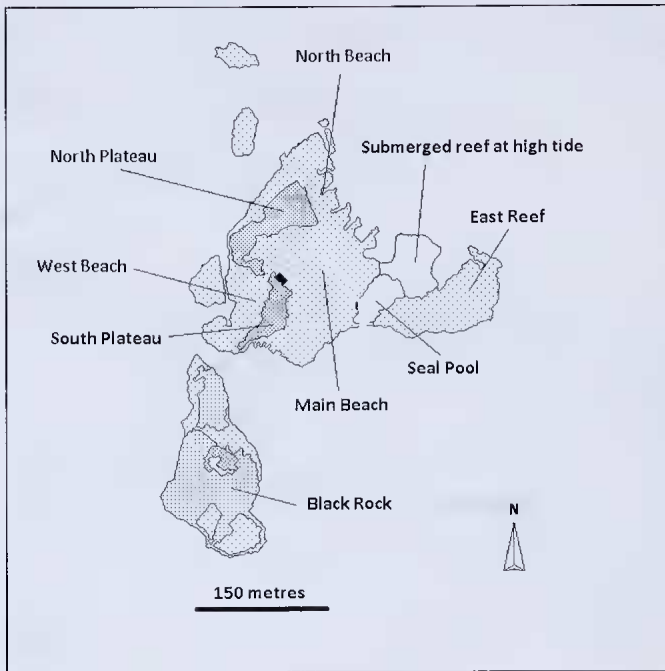


Fig. 2. Names used for locations on Seal Rocks.

team members' contributed sightings; brief entries in surviving personal diaries kept by Fred Baum (1965-1968, 1970-1971) and Kevin Chipperfield (1968), which include visits when RMW was not present; and Phillip Island Nature Park research group's records of 40 visits between 1997 to 2005. A negative linear binomial generalised model was used for looking at the seasonal pattern of Kelp Gull numbers using R software (version 2.15.1; R Development Core Team 2012).

Physical and biological features of Seal Rocks

The continuing effects of tides and storms on the geology of the islets have resulted in a varied topography of plateau tops, cliffs with ledges and undercuts, caves, gullies, boulder-strewn upper slopes, cobblestone-pebble shingle, worn wave-washed shore platforms with some deep tide pools, and many ephemeral tide pools flushed only by the highest tides or storm seas. Both islets are basically low platforms of fine-grained black basalt surrounding areas of plateaux of varying height to about 12 m above sea level. These plateaux are remnants of later vol-

canic events and consist of deposits of tuff overlain by lava flows. Storm waves have eroded the softer tuff and this has led to undercutting and rock falls from above. Many cliff faces are sheer with narrow ledges, and shallow caves occur at the south end of South Plateau and on all sides of Black Rock's central plateau.

Land plants survive only where the seals have no or only limited access, i.e. on cliff faces and some parts of the plateaux tops. Gravel from weathering of the volcanic rock tends to accumulate on ledges and in fissures on cliff faces, and supports clumps and mats of Rounded Leaf Noon Flower *Disphyma australe*. Along the margins of abrupt cliff tops, where resting seals are less inclined to lie, this plant has a precarious hold and generally forms a narrow ridge-like mat. Seedlings of Ruby Saltbush *Enchylaena tomentosa* were occasionally found, apparently imported via bird faeces or pellets. If they germinated in protected places on the cliffs they flourished for several years. Other colonists were Bower Spinach *Tetragonia implexicoma*, Cape Weed *Cryptostemma calendula*, Sow

Thistle *Sonchus* sp., a nightshade *Solanum* sp. and Boxthorn *Lycium ferrosissimum*, but, with the exception of Bower Spinach and Southern Sea-heath *Frankenia pauciflora*, none survived for long. Small mats of Beaded Glasswort *Salicornia quinqueflora* were found on Black Rock plateau in 1968 and 1971. A profusion of marine plants and invertebrates occurred at the edges of the shore platforms and on East Reef in the intertidal zone, including seaweeds, kelp *Macrocystis* sp., cunjevoi *Pyura* sp., barnacles, limpets, chitons, mussels (mainly *Xenostrobus* sp.) and the gastropods *Subnina* sp. and *Nerita* sp. were very common. Dense beds of kelp also occurred in the shallow bay formed by the two islets on the eastern side.

The insect fauna appeared to be diverse and most forms were seen only during the warmer months. It included field crickets *Teleogryllus commodus*, at least six different kinds of wasps (especially the orange ichneumon *Netelia* sp.), a black ant and a small black native bee; blowflies (*Calliphora* sp.) and a small black fly common in humid weather and attracted to sweaty skin; dragonflies and damselflies; moths (most notably *Agrostis* sp.) and butterflies (including *Vanessa kershawi*), and mosquitoes, noticeable only when a sheltered depression in the lee of the south end of North Plateau was sporadically filled by sea spray and rain showers, in which larvae were observed.

Species notes

Nomenclature and systematic order follows Christidis and Boles (2008).

Stubble Quail *Coturnix pectoralis*

Eight records of lone birds sighted on or about South Plateau, among the mats of noon flower or in the cover of rocks, in November of 1965, 1967 and 1969, December 1971, and in October and December 1975. The desiccated remains of a bird were found on South Plateau on 16 November 1967. Specimen RW#465, collected 25 November 1969 (Museum Victoria).

Black Swan *Cygnus atratus*

Four records of birds in transit; eight were seen heading west on 15 December 1969, one heading south on 19 December 1970, 11 heading west on 23 February 1972, and five heading north on 18 November 1975.

Australian Shelduck *Tadorna tadornoides*

A line of seven passed by to the north on 20 December 1974 flying towards the west.

Pacific Black Duck *Anas superciliosa*

A pair on 19 October 1970 flying slightly east of south, but they turned west before being lost to view.

Rock Dove *Columba livia*

Seven sightings of lone birds during the first survey period, in January and between May and August, and one of a group of three in November. Most were seen flying over or past the islets and generally in a northerly direction. On two occasions, lone birds landed.

Common Bronzewing *Phaps chalcoptera*

One record only, of a bird seen to pitch into the noon flower sward at the north end of South Plateau on 24 April 1968. It appeared to be moulting, having only one remaining loose tail feather.

White-throated Needletail *Hirundapus caudacutus*

One sighting of a lone bird that passed low over Seal Rock from the north-east at 17.30 hr on 17 January 1969 shortly after a north-westerly change. This species has been sighted over tidal flats on Western Port (Davies and Reid 1975b).

White-faced Storm-Petrel *Pelagodroma marina*

One record of a bird that flew into the field station through the open door on 18 October 1967 at 20.00 hr.

Wandering Albatross *Diomedea exulans*

Twenty-two sightings offshore during the first survey period, between mid-June to mid-November, and two additional records in mid-January. Most sightings were of lone birds gliding in rough windy weather, well offshore within a broad arc from the south-east to the north-west, and predominantly during south-westerly blows. Six sightings were of lone birds flying in calm conditions.

Black-browed Albatross *Thalassarche melanophris*

The most commonly observed albatross, from April to mid-December, but the majority of sightings (247 of 262) were from June to August; frequently in association with Shy Albatross *Thalassarche cauta*. Peak numbers were

recorded in the latter parts of May or June, usually on days of very rough weather. The greatest concentration was noted on 23 June 1971 during a hard south-westerly gale, when over 200 were in view within an arc from the south-east to the south-west. This species was observed only once in the second survey period when ten birds were seen on 25 May 1999. Despite frequent sightings close to shore early in the first survey period, feeding was rarely observed. On two occasions three to six birds fought over flotsam, identified in one instance as a large cuttlefish (probably *Sepia apama*); on another, two birds were observed harassing a seal thrashing a moderately large prey item at the surface, and on a third occasion several albatross paddled up to an Australasian Gannet *Morus serrator* when it surfaced with a fish and attempted to snatch it.

Shy Albatross *Thalassarche cauta*

Active offshore in small numbers from late April to mid-December (28 records), but with no obvious peak or influx as in the case of the preceding species. Possible feeding activity was observed on 15 June 1969 when several birds settled on a patch of discoloured water, which may have been a surface shoal of fish, to the south of Black Rock.

Southern Giant-Petrel *Macronectes giganteus*

Giant-Petrels were frequently seen offshore from June to December throughout the 40 year period, with a few additional sightings of lone birds in January, February, April and May. Dark-plumaged individuals predominated, with only three all-white (June, September), one grey (June) and one pale-headed individual (June) in 157 sightings. Only one record was made in the second survey period (June 2005).

Despite Giant-Petrels being avid scavengers of dead seals on many subantarctic seal islands and the frequent presence of seal carcasses on Seal Rocks, only two instances of scavenging by Southern Giant-Petrels were observed, on 27 May 1972 and 24 June 1972. However, Giant-Petrels were seen feeding on carcasses floating offshore on several occasions, and once two Giant-Petrels were observed paddling about over a concentration of Coastal Krill *Nyctiphanes australis* and small fish, which in turn had attracted albatrosses, gannets and other small seabirds.

On three occasions a lone Giant-Petrel was seen ashore on the Main Beach breeding area, resting or walking among the fur seals with wings partly opened. Juvenile seals and even adult males retreated, whereas cows with young pups responded with open-mouthed threats.

Northern Giant-Petrel *Macronectes halli*

Only one certain record of a bird resting on the water off East Reef on 5 February 1979 (RMW, FTB).

Southern Fulmar *Fulmarus glacialis*

A lone bird was sighted by KJC flying low over North Beach at midday on 22 August 1968.

Cape Petrel *Daption capense*

Eight sightings of lone birds between June and September, of a pair on 22 August 1968, and of a lone bird in mid-December. Usually seen flying low over the water and if alighting only for brief periods. On two occasions a Cape Petrel hovered about in the vicinity of a resting Giant-Petrel, but no interaction occurred. Specimen RW#216 collected 22 August 1968 (Museum Victoria).

Fairy Prion *Pachyptila turtur*

Observed once, on 16 June 1969. A group of 20-30 dived repeatedly into a swarm of krill located about 1.5 km south of Black Rock in company with feeding Short-tailed and Fluttering Shearwaters and White-fronted Terns. Specimen RW#414, collected 16 June 1969 (Museum of Victoria), a male, testes minute, heavy sub-cutaneous fat deposits, stomach filled with Coastal Krill *N. australis*.

Short-tailed Shearwater *Ardenna tenuirostris*

The daily passage of large numbers of this shearwater to and from breeding colonies on the south-west and south coasts of Phillip Island was a feature of the offshore bird activity from October to February each year. Thereafter to the beginning of May the number and regularity of sightings declined. Observations fell into three broad categories — morning exodus and evening return, localised activity at the sea surface within 3-4 km of Seal Rocks, and individual birds at or close inshore.

The morning exodus in calm to moderate weather was an orderly stream passing East

Reef heading to the south and south-west; no movement to the south-east was observed. In strong winds and heavy seas the birds were active offshore all day, widely dispersed on all sides and seemed to circle the islets both clockwise and counter-clockwise. Landward movement in the evening was always diffuse. In flat calm seas, large rafts (c. 300-500 individuals) of these shearwaters were occasionally noted about 3-4 km offshore to the south-east and always in the same general vicinity. During the morning these rafts continually broke up and reformed nearby, but if present in late afternoon they were more stable, with most birds resting quietly. Infrequently, large flocks and small groups were seen feeding at the surface to the south-east, south and south-west. Temporary rafts formed when birds alighted over concentrations of krill, dipping and diving beneath the surface. In January and February 2000, c. 3500 and 200 respectively were recorded feeding within several kilometres of the islets.

Crested Terns and Fluttering Shearwaters were occasionally seen feeding with Short-tailed Shearwaters on the same concentrations. Most unexpectedly, a few Short-tailed Shearwaters were seen in June 1969, on several occasions during the 15th, 18th and 19th. The context of these sightings was remarkable in that these birds were active on a large swarm of Coastal Krill, together with Fairy Prions, Fluttering Shearwaters, White-fronted Terns, Silver Gulls, Black-browed and Shy Albatross, Giant-Petrels and Australasian Gannets. However, only the shearwaters, prions and terns were feeding directly on the crustaceans.

On rare occasions lone Short-tailed Shearwater were seen resting on the sea, and in calm conditions were prone to attack by predators. In one instance two immature Pacific Gulls repeatedly buffeted the Shearwater when it attempted to lift off the surface, knocking it down into the water. On another occasion two Giant-Petrels were seen tearing at a helpless bird floating at the surface. Despite opportunities for Australian fur seals to prey on Short-tailed Shearwater in nearby waters, no instances were observed. Similarly, Deagle *et al.* (2009) found no evidence of shearwaters (or any other birds) in the faeces of fur seals at Seal Rocks.

Fluttering Shearwater *Puffinus gavia*

Recorded on 16 occasions offshore in the first survey period, most frequently in June-July and October-November, usually in groups of 2-5 birds. On 3 November 1969 at least 50 were observed feeding within 100 m of North Beach. Sightings in January, April and September were of single birds. In calm weather feeding birds rose from the surface, flew a short distance and plunged in with wings extended. In rough weather they would fly into the face of an oncoming wave, emerge from the rear and fly into the next. By dropping back 50 m or so with the wind after passing through a succession of waves the same general vicinity would be worked in this way for about an hour. Specimens RW#416, 16 June 1969; RW#449, 20 October 1969 (Museum Victoria).

Common Diving-Petrel *Pelecanoides urinatrix*

One record only, of a desiccated carcass found in the enclosed South Plateau observation hide on 26 May 1976. It had entered via a narrow gap in the roof at some time after 7 January 1976. On 25 May 1976 RMW, on board the *Lorraine May* of San Remo, observed a widely dispersed group of 50+ Diving-Petrels off Pyramid rock, approximately 13 km east of Seal Rocks.

Little Penguin *Eudyptula minor*

Breeding was not observed, but small numbers came ashore to moult or rest or because they were sick or injured. Moulting birds were found from mid-January to mid-April, but as sites free of disturbance by seals were few, the maximum number of birds found at any one time was eight. Moulting birds hid behind fallen boulders at the base of South Plateau and North Plateau or in shallow caves, or took advantage of artificial shelter afforded by a wood stack and a section of flooring stored under a cliff overhang. Four single birds were found moulting in crevices around South Plateau between February and May 1997-2005.

Penguins found at other times of the year (24 alive, 21 dead) were all in light to poor condition; in eight instances they were wholly or partly stained by oil. A young lightly oiled bird found on 16 January 1973 was infested with a large number of ticks attached to the back of

its head and neck. Ten carcasses were found within tide reach and may have died at sea, but the remainder had died where they had taken shelter. On 10 occasions, live penguins were seen during the day among fur seals resting on Main Beach and North Beach, and were completely ignored by the seals, although the Cape Fur Seal *A. pusillus pusillus* and the New Zealand Fur Seal *A. forsteri* are known to prey upon penguins (Shaughnessy 1978; Page *et al.* 2005). Although in plain view of Pacific and Silver gulls, on only one occasion was a penguin harassed and forced to retreat to the sea. Penguins were occasionally seen feeding within about 100 m of the shore and often were heard calling in calm, foggy weather.

Frigatebird *Fregata* sp.

A single sighting, on 20 December 1968 by RMW and WMB. Shortly after 13.00 hr, attention was drawn by a chorus of alarm calls from the colony of Silver Gulls to a dark bird passing south over East Reef. Although closely pursued by the gulls it flew unhurriedly off to the west.

Australasian Gannet *Morus serrator*

Seen frequently offshore throughout the year, but most often between November and January, and generally out to sea within an arc from east to south-east or from west to south-west. About half of the 151 records were of lone birds and the remainder were of groups of 2 to 30, usually flying in lines abreast or trailing. Immature gannets in mottled plumage were seen in all months, alone, in pairs and in the company of adults. Feeding dives were seen on a few occasions (see notes on Short-tailed Shearwater) and in May 1999, groups of 20 and 30 were seen feeding in conjunction with Crested Terns and Silver Gulls, on clupeoid fish probably being driven to the surface by Australian Salmon *Arripis truttaceus*.

Little Pied Cormorant *Microcarbo melanoleucos*

One bird, probably the same individual, was sighted on most visits through 1971 and 1972 (26 records) and was usually actively fishing. Lone birds were seen infrequently in 1969, 1973, 1976, 2001, 2002 and 2003 (12 records). Fishing activity was confined to the protected waters of the landing gutter, Seal Pool and the deep tide pools at the south end of Main Beach. Juvenile Bluethroat Wrasse *Notolabrus tetricus* up to 15

cm long were a common prey, and one other fish taken appeared to be a Crested Weedfish *Cristiceps australis*, which occurred in the permanent tide pools. When in the water the bird was extremely wary of seals and when resting always chose a rock well clear of those ashore. It became noticeably agitated if the resident Kelp Gulls passed overhead, but tolerated the close proximity of other resting cormorants.

Great Cormorant *Phalacrocorax carbo*

During the first decade of this survey this species was a rare visitor, in spring and summer, with only four sightings of one or two birds present for two or three days. During the afternoon of 24 November 1976, 6-10 birds settled near Black-faced Cormorants on North Plateau and towards evening a flock of 60+ flew past; the last and maximum count on North Plateau that season was 30 on 14 December 1976. Up to five were recorded at the roost in November and December 1977 and one to two in December 1978 and 1979. Single birds were recorded on North Plateau on visits in October and November 1999 and January 2000.

Little Black Cormorant *Phalacrocorax sulcirostris*

Four records only; of a single bird resting among a group of immature Pacific Gulls on Main Beach on 23 October 1972, of two birds resting near a Little Pied Cormorant and Black-faced Cormorants on Main Beach on 16 November 1972, of a single bird resting with Black-faced Cormorants on North Plateau on 27 December 2002, and a desiccated carcass on Main Beach below South Plateau on 6 January 1977.

Pied Cormorant *Phalacrocorax varius*

Six records in January, March, August and December of lone birds standing quietly on rocks close to the water's edge. One additional sighting was of two birds that perched briefly on the steel flying-fox cable mid-way between the islets, on 7 March 1969. Not recorded in the second period of the survey.

Black-faced Cormorant *Phalacrocorax fuscescens*

In groups generally less than four, rarely more than 10, from February to November, roosting in the evening on portions of high rock masses not used by the fur seals, i.e. the south-east point of Black Rock and the north edge of North Plateau, with a distinct preference for the

latter. In December to January over seven seasons (1966–1972), numbers increased to an average of 26 and 32 respectively. A maximum of 67 was recorded on 14 December 1977. In the second survey period, numbers ranged from 0–57 and averaged 11.7.

On North Plateau they invariably roosted in a group along the northern edge, spaced uniformly about 1 m apart, standing or sleeping in an upright posture. Individuals sometimes tore up abandoned Silver Gull nests of dried noon flower stems, tossing beakfuls of the material into the air. Their roosting area became heavily fouled with white guano splashes during summer and encroached on nest sites of Crested Terns, Silver Gulls and a pair of Sooty Oystercatchers. Some birds were occasionally seen fishing in open waters near shore, but never in the Seal Pool or in the deep tide pools on Main Beach. Disgorged food items found in the roosting area on North Plateau included a small leatherjacket (Aluteridae) and an Australian Salmon.

Cattle Egret *Ardea ibis*

Single record of a solitary bird on Black Rock on 13 April 2000.

White-faced Heron *Egretta novaehollandiae*

Thirty-one records, mainly of lone birds, but also of groups of up to 10 in summer and autumn during periods of calm weather. About half the sightings were of birds flying past directly towards Phillip Island or north-west. Those seen on shore chose to roost either on the plateaux or outer reef areas well clear of any seals.

Royal Spoonbill *Platalea regia*

One sighting of a lone bird on 27 January 1966 that circled above Seal Rocks several times and then settled briefly on East Reef before heading north into a light north-easterly breeze.

White-bellied Sea-Eagle *Haliaeetus leucogaster*

One sighting on 16 November 1977 of a lone adult that made a low leisurely circuit of the islets followed by a mob of screaming Silver Gulls, that were at the peak of nesting. This bird was probably one of a pair resident at French Island and often seen in the vicinity of Sandy Point 17 km to the north (Davis and Reid 1975a).

Swamp Harrier *Circus approximans*

Four records of one or two birds passing — on 4 November 1969, 25 July 1971, 21 September 1971 and 18 January 1973. The resident Silver Gulls were greatly alarmed when they flew overhead and on one occasion a pair of nesting Kelp Gulls pursued a lone Harrier so closely that it was forced to flip and present its talons to break up the attack. The July record was of a lone adult flying slowly due south and steadily gaining in altitude until out of sight. A fifth record was of a lone bird perched on a wooden plank near the field station on 13 August 1969.

Nankeen Kestrel *Falco cenchroides*

Six sightings in January (1966, 1968 and 1972), and single sightings in April 1966, September 1968, November 1970 and June 1972. All were of lone birds either perched on cliff ledges or the railing of the observation tower's upper deck, or hovering over the plateaux. On 19 June 1972 a large female was disturbed from the carcass of a Common Starling from which most of the flesh had been stripped. She later returned and carried off the remains. Later that day two other partly consumed Starlings were found on Main Beach and South Plateau. The hind end of a small rat (possibly *Rattus norvegicus*), found on North Plateau two days later, had probably been carried to the islet by this Kestrel.

Brown Falcon *Falco berigora*

Four records; two birds on 20 January 1966, and lone birds on 26 February 1966, 17 January 1972 and 17 November 1977. On the first three occasions the birds remained high and showed interest in the activity of Silver Gulls and Crested Terns below, but they eventually flew off towards Phillip Island. On the last occasion the Falcon took a Silver Gull chick from West Beach and flew off to the north-east. Although the gull colony was greatly alarmed, the Falcon was not pursued.

Peregrine Falcon *Falco peregrinus*

Four records, possibly of the same bird, on 2 and 10 November 1970 and on 9 and 15 January 1971 circling the islets. On the latter two occasions it was driven from the vicinity of North Plateau by a mob of Silver Gulls and flew off to the Nobbies, rousing the gull colony there.

Australian Pied Oystercatcher *Haematopus longirostris*

Two birds were sighted on 4 and 16 November 1969 and lone birds on 7 October 1970 and 15 November 1972. All records were of birds making several circuits of the islets before heading off towards Phillip Island. On one occasion two birds settled on East Reef but were quickly driven off by a resident pair of Sooty Oystercatchers.

Sooty Oystercatcher *Haematopus fuliginosus*

Three resident pairs routinely nested on the islets throughout both survey periods. The maximum number recorded was nine on 25 October 1999 and there were less present in winter, usually four to six birds. The mean (\pm s.e.) of 39 counts in the second survey period was 2.6 (± 0.37). Until the arrival of a pair of adult Kelp Gulls in late 1970, two pairs nested on North Plateau and a third on Black Rock plateau. In subsequent seasons the Kelp Gulls ousted the latter, at a time when nesting by the other pairs was well advanced. The ousted pair then established a nest on the southern 'toe' of North Plateau, on two occasions appropriating a Silver Gull's nest. The North Plateau pairs were aggressively territorial, establishing their nests at least 35 m apart. During the entire span of 14 years these nest sites shifted by only a few metres. Nesting Silver Gulls were tolerated to within 3 m. Inter- and intraspecific interactions were common, and the latter were especially intense when parents were attending their recently hatched and highly mobile chick. On one occasion a sitting oystercatcher leapt up, caught and throttled a recently fledged Silver Gull that had ventured too near. The Gull was held down by a beak hold behind its head, the Oystercatcher standing motionless with its feet braced wide apart until the Gull was dead.

In 13 seasons the North Plateau pairs produced at least 25 clutches (14 \times 2 eggs, 5 \times 1 egg, 6 \times eggs not visible). On four occasions two clutches were laid in a season, three after early failures, and in each case a chick was reared to fledging; in the fourth instance two eggs were laid after the fledging or loss of a near-fledged chick (c. 42 days after the first hatching), but the fate of the second clutch was not observed. In no case of clutches of two eggs were two chicks reared,

apparently because the first chick to emerge was moved by the parents and the second egg was abandoned in the nest — a sequence observed in two instances. Of the possible maximum production of 25 fledged young by the North Plateau pairs only 14 large 'runners' were actually found, partly because the parents were adept at hiding them in crevices and narrow spaces under boulders where their plumage blended perfectly with the black basalt. When we searched for these runners to band them, a parent would occasionally resort to a 'broken wing' display to lure the intruder away.

The success of the Black Rock pair was very difficult to follow, but in the five seasons prior to being ousted by the Kelp Gulls in 1972 they hatched at least three chicks. In the seven subsequent seasons when they nested on the southern 'toe' of North Plateau only five clutches were seen (3 \times 2 eggs, 2 \times 1 egg). In the summer of 1973/74 the Kelp Gulls abandoned Black Rock for Seal Rock and the Oystercatchers reclaimed their old nest site. They were first seen there on 10 January 1974 and four days later the nest contained one egg. The fate of this nesting was not observed. For the first four to five days after hatching chicks were fed small insects and arthropods probed for by their parents in the mats of noon flower, the chicks running from one to the other whenever something was captured. Thereafter chicks were fed with the flesh of chitons, small limpets, and univalve gastropods (*Nerita* sp.) garnered from the outer inter-tidal zones of Main Beach, East Reef and Middle Reef.

Adult Oystercatchers were extremely sensitive to the presence of humans and immediately vacated a nest if approached to within 50 m. This is similar to the flight initiation distance reported for this species by Glover *et al.* (2011). Despite great care to minimise disturbance, this was undoubtedly the cause of some nest failures as Silver Gulls were quick to plunder an egg and were suspected of taking at least one exposed newly hatched chick. It is likely that the poor success of the Black Rock pair when nesting on North Plateau was exacerbated by their close proximity to the field station located only c. 40 m away. One of these runners, banded on North Plateau 5 January 1977, was later found as a desiccated carcass on Forrest Caves beach, Phillip

Island on 24 April 1987. Another, banded on North Plateau 4 January 1980, was seen at Long Island Point near Hastings on 1 August 1981 and was subsequently trapped there on 12 June 1988 and released. Two resident colour-banded birds in the second survey period were banded respectively at Flinders (c. 10 km north-east) two years earlier and in Corner Inlet (c. 125 km south-east) six years earlier (as a two-year old).

Masked Lapwing *Vanellus miles*

A pair on Black Rock on 22 January 1968. One heard by KJC calling during night of 21–22 August 1969.

Ruddy Turnstone *Arenaria interpres*

In the first survey, Ruddy Turnstones were observed on all visits except during the winter of 1969. From March to August they were usually seen in groups of 5 to 10, their numbers then increasing substantially to about 50 in November to January. A few birds in richly coloured plumage were seen in April, July, August and September. In the second part of the survey, numbers ranged from 0 to 11 and averaged two birds per visit. Turnstones were observed on only 47% of visits in the second survey period.

Dispersed groups were often seen feeding along the shoreline at low tide, among weedy rocks and over beds of cunjevoi *Pyura* sp. Occasionally small flocks were seen moving about on, and the slopes above, the Main Beach and twice on South Plateau among clumps of noon flower where they appeared to be searching for insects. Towards evening and during strong winds they congregated to roost in sheltered parts of the shore platforms and often among the fur seals, where they moved about confidently and were totally ignored. Turnstones were often seen resting in very close proximity to Pacific Gulls.

Arctic Jaeger *Stercorarius parasiticus*

Thirteen sightings were logged of one to four individuals active offshore during spring and summer — from October to March in the first survey period. Most often they were noticed in November to January, when pursuing Silver Gulls returning from Phillip Island or the Mornington Peninsula with food for their young.

Fairy Tern *Sterna nereis*

Two or three birds seen offshore on three occasions by KJC in late December 1965 and a lone bird on 17 January 1966.

Caspian Tern *Hydroprogne caspia*

Recorded only once, by KJC on 31 November 1968 feeding offshore. The Tern subsequently landed on North Plateau, but flew off when alerted by alarm calls of Silver Gulls.

White-fronted Tern *Sterna striata*

Commonly seen from late April to mid-November feeding offshore and often diving for small fish close in to the rocks, in the Seal Pool and in the shallow landing gutter. Often roosted overnight on Seal Rock, generally in groups of less than 10, but occasionally there were 50. They intermingled freely with roosting Crested Terns. On 16 June 1969 White-fronted Terns were seen diving into a swarm of krill to the south of Black Rock, where Fairy Terns, and Short-tailed and Fluttering Shearwaters were also feeding. Specimen RW#415 (Museum Victoria), stomach contained Coastal Krill; subcutaneous fat light orange in colour. This species was not seen on or in the vicinity of Seal Rocks during the second survey period but has been recorded occasionally along the southern coast of Phillip Island (Norman 1992) but not in Western Port between 1991 and 1994 (Dann *et al.* 2003).

Crested Tern *Thalasseus bergii*

Before the field station was erected on the South Plateau in December 1965, 40 nests were found on a narrow band of noon flower growing at the cliff edge, and at least eight pairs had nested on the north-west corner of North Plateau. After 1965 all nesting activity was concentrated on North Plateau, but only 20 nests were established. The output of this colony was about 12 young/yr until 1971/72 when the entire nesting was lost due to unusually heavy seal traffic on that plateau. In 1972/73 only three nests were found there, but eight nests were established on the upper boulder slope of West Beach among nesting Silver Gulls. During the next four seasons (1974/75 to 1977/78) nesting was confined to West Beach, but the maximum number did not exceed six. In 1974/75 and 1977/78 two

nests were established on the north end of South Plateau, which had not been visited during the period of courtship and nest-making in October, but occupation of the field station led to their failure. The last breeding recorded at Seal Rocks was of six nests in 1978 (Harris and Bode 1981). In 1994, a large colony became established at The Nobbies, 2 km north-west, and numbered 2050 nests by 2001 (Minton *et al.* 2001, Chiaradia *et al.* 2002).

Pairs engaging in high spiralling courtship flights were noted as early as 9 August and as late as 15 January. Some pairs slowly circled to heights of well over 300 m, came together and then plunged, one above the other, in a spectacular, slow-spiralling power-dive to within 10 to 20 m of the sea. Copulations were observed as early as 7 October and nests with eggs as late as 17 January. Chicks at the runner stage were moved to the shore platforms of North Beach and West Beach where they were protected by groups of adults, as many as three adults closely attending a single chick. Parents flying in with a fish were occasionally harried by Jaegers and on one occasion an adult with a bulging crop was pursued by a Kelp Gull. Fish up to c. 8-10 cm in length were fed to large chicks.

Crested Terns roosted throughout the year on both islets, but mainly on Seal Rock, usually as a single aggregation and often with White-fronted Terns. On Seal Rock their numbers varied erratically from less than 50 to more than 500, and in general the largest flocks occurred in late spring and summer. Exceptional concentrations were noted in 1972, of 1200-1500 on 16 November and of c. 2000 on 17 December. Roosting terns preferred the boulder and cobblestone-pebble areas of Seal Rock and the broad ledges of Black Rock, their selection depending on the strength and direction of the prevailing wind. During south-westerly gales terns congregated to roost on Main Beach in the lee of the South Plateau, where they crouched low and adjusted their orientation to any shift in wind direction.

Dead, injured and moribund adult Terns were found on Seal Rock from time to time and, on one occasion, an injured bird was attacked by Silver Gulls.

Pacific Gull *Larus pacificus*

These birds do not nest on the islets and were normally seen resting on North Plateau, Main Beach and outer rocks, especially on East Reef. At least one pair of adults was noted on most visits in the first survey period, commonly there were three to five but not more than six. Counts of immatures varied more, from 2 to 50, with a tendency for larger numbers in winter. The maximum count of 50 on 9 February 1979 was of equal numbers of juveniles and immatures. This seasonal variation correlates with counts made in the vicinity of Sandy Point to the north (Davis and Reid 1975a). By contrast, Pacific Gulls (adults and immatures combined) were seen on only 60% of visits in the second survey period and never more than six were seen.

In strong winds Pacific Gulls sought protected areas, in particular the lower shingle slopes of Main Beach. They often competed with Silver Gulls for food items vomited by seals, and for fresh placentae during the pupping season, but were more watchful and tentative when in a close press of seals. Adult birds were seen to feed on the gastropod *Subnirrella* sp., which was common at the outer edge of the reefs, by dropping the shells from a height of 10 m or so onto the rocks to break them open.

A juvenile in dark plumage and with a badly injured wing was seen on Seal Rock on 14 November 1977. It was still alive on 28 March 1979, in sub-adult plumage, having survived by scavenging among the seals and tide-washed flotsam.

Kelp Gull *Larus dominicanus*

Lone adults were recorded on 22 August 1968 and 6 March 1969, and an adult pair arrived on 18 December 1970. They nested the following month on Black Rock and in all subsequent summers to 1979, when two additional pairs established nests. Other pairs were sighted on 29 October 1972 and 12 December 1977 but did not remain.

For some days after their arrival the founding pair was harassed by Pacific and Silver Gulls and by one pair of Sooty Oystercatchers, but this aggression quickly waned. Over the following eight seasons this pair produced a minimum of

14 eggs in eight clutches (1 × 3 eggs, 4 × 2 eggs and 3 × eggs not seen) from which 12 chicks were hatched and seven fledged. The progress of the 1971/72 nesting on Black Rock was not observed but a juvenile was seen in flight on 26 February 1972.

In the 1974/75 and 1978/79 seasons the original pair lost clutches when the nests were trampled by seals, and although a second nest mound of noon flower stems was raised nearby no eggs were laid. In 1973/74 and 1975/76 they abandoned their first nest (laying was not verified) and shifted to the other islet. In 1971/72 and 1977/78 a second nest was raised after the first brood fledged and in the latter season the first nest was renovated as well, but no eggs were laid. In January 1979 all three pairs laid, but two nests (clutch of two eggs in one; other's eggs not seen) were lost due to seal traffic. The third pair laid three eggs and two young were fledged. Laying dates varied from 28 October (estimated) to 13 January (observed), with most being laid between mid to late November.

Adult Kelp Gulls were dominant in any interaction with Silver and Pacific Gulls and routinely ousted a breeding pair of Sooty Oystercatchers from their favoured nest site on Black Rock. Physical clashes did not occur except for one instance on 15 November 1977 when a nesting adult killed a recently fledged Silver Gull

that ventured too near. Caught in a powerful beak hold behind the head, the young gull was jerked about violently and thrashed and then despatched with downward stabbing thrusts to the body. On 18 January 1973 the pair pursued and attacked a passing Swamp Harrier.

Kelp Gulls competed with other gulls for fragments of fish and squid vomited by seals, and for fresh placentae, and occasionally pecked at fresh seal carcasses. No predation of the eggs or chicks of other nesting birds was seen.

The mean number of Kelp Gulls frequenting Seal Rocks in the second survey period was 30.1 (± s.e. 2.9) and ranged from 1 to 96 birds. There was some seasonal variation in numbers with generally higher numbers in spring and summer (Fig. 3). It was noticeable during winter that Kelp Gulls occurred in greater numbers across the southern shores of Phillip Island and on the Mornington Peninsula to the north (pers. obs.). In 2005 it was estimated that the number of breeding birds in 2002 was c. 50, and that pairs had started nesting on the western end of Phillip Island in 1995 (Dann 2007).

Silver Gull *Chroicocephalus novaehollandiae*

In the first survey period, this species was present all year and bred on the plateaux of both islets, on cliff ledges and amongst boulders on West Beach and Main Beach. The airspace beneath the floor of the field station was particularly favoured. Breeding pairs were estimated at 250 to 300, with no marked fluctuations from year to year. On 30 October 1978 Harris and Bode (1981) counted 192 occupied nests and 63 new but empty nests on Seal Rock. A marked post-breeding exodus occurred, with numbers dropping to as low as 20; however, the flock size between breeding seasons fluctuated erratically and occasionally exceeded 600. The mean number of Silver Gulls frequenting Seal Rocks in the second survey period was 177.3 (± s.e. 58.1) and ranged from 0 in August 2002 to 2000 birds in May 1999. Breeding was greatly reduced in the second survey period with fewer than 10 nests being found in most years usually above the field station built in 1979 and a few isolated nests on Black Rock. Silver Gulls have bred at the western end of Phillip Island since 1970s (Loyn 1975) and the colony has grown to about 2500 birds (PD pers. obs.).

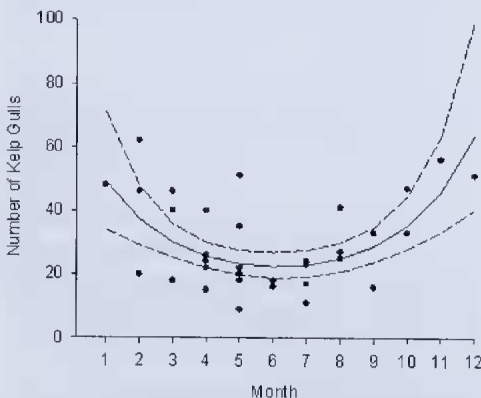


Fig. 3. Counts of Kelp Gulls recorded on Seal Rocks 1997 to 2005 by month. Numbers were greater in spring and summer. The quadratic function is significant ($r^2 = 0.8$). The dashed lines are 95% confidence limits.

The commencement of egg-laying (on South Plateau) varied by as much as a month (27 July 1968, 21 August 1969, 21 July 1970, 27 August 1971) and the peak of breeding, in terms of the number of occupied nests, occurred 8–10 weeks later, at about the time the first fledglings were leaving the nesting area. Clutches were usually of two or three eggs, in nests formed of dried noon flower stems and a few feathers.

The fur seal colony provided a supplementary source of food during the latter part of the nesting season, when large numbers of pregnant females were ashore to give birth. Placentae and associated membranes from 2000+ births were shed between early November and mid-December, but only about half were thoroughly scavenged. Silver Gulls were quick to detect a female seal in labour or any seal showing signs of vomiting the remains of a previous meal. Gulls fed eagerly on any partially digested fish or squid and also on clotted masses of curdled milk that pups would occasionally vomit if trodden on by a large breeding male. Experience of this kind led some gulls to pounce on freshly voided seal faeces of an unusually pale cream colour, but they quickly stopped after a few beakfuls. Ever the opportunists, a group of gulls was observed avidly to devour a large mass of c. 80 mature tapeworms discarded after the dissection of a seal's digestive tract – behaviour that probably explained why strands of ripe proglottids were not found in any masses of soft faeces voided on shore. Individual gulls were attracted to and pecked at fresh wounds on fur seals and eagerly fed on clotted blood.

Insects were taken opportunistically. Gulls often snapped at blowflies *Calliphora* sp. attracted to seal carcasses and were adroit at catching moths *Agrotis* sp. which appeared in large numbers at various times on 17 October 1968, 4 November 1969 and 19 April 1977. They pounced on moths amongst the noon flower and pursued them when they swarmed into the air as high as 100 m. Larvae of the common cockchafer *Adoryphorus couloni* were fed to chicks by parents that followed the spring ploughing on Phillip Island and Mornington Peninsula. These grubs appeared to be an important source of food in some years. Un-defended gull eggs were soon broken and devoured by other gulls, as were those of Crested

Terns and Sooty Oystercatchers. Very small gull chicks that were displaced from the nest and not defended were pounced on by other adults, thrashed vigorously and then swallowed; unprotected larger chicks or 'runners' in down were pursued, buffeted and pecked about the head until they died.

Inadvertent disturbance by humans and by the fur seals contributed to this mortality and probably reinforced the tendency of parents to move their advanced chicks to the periphery of the nesting areas.

Silver Gulls were alert to any activity at sea nearby, flocking to investigate feeding by Crested and White-fronted Terns or the commotion caused by a Great White Shark *Carcharodon carcharias* preying on a seal at the surface, or a seal thrashing a large fish. On several occasions flocks of more than 100 gulls were observed feeding on surface shoals of small fish.

Apart from cannibalism only two instances of predation of Silver Gulls were observed—of an adult gull by an Eastern Barn Owl *Tyto javanica* on 5 October 1970, and of a chick by a Brown Falcon on 17 November 1977. On two occasions fledglings were killed when they ventured too close to nests of other species—by a Kelp Gull on 15 November 1977, and by a Sooty Oystercatcher on 25 November 1978. Silver Gulls were observed to harass and mob predators such as Eastern Barn Owl, Brown and Peregrine Falcons, White-bellied Sea-Eagle and Frigatebird, but were tolerant of Kelp and Pacific Gulls unless they approached occupied nests or runners.

Blue-winged Parrot *Neophema chrysostoma*

Two records of lone birds, on 19 March 1968 and 3 November 1969. The dates of these visits accord with the seasonality of sightings at Sandy Point (Davis and Reid 1975b). Specimen RW #454, (Museum Victoria) collected 3 November 1969, female, heavy mesenteric and subcutaneous fat deposits over abdomen and base of neck; ovary 8 x 5 mm, largest follicle 1.3 mm, crop empty.

Pallid Cuckoo *Cacomantis pallidus*

Seen only once, on North Plateau on 18 March 1968.

Eastern Barn Owl *Tyto javanica*

Six records and some prey remains, possibly representing the activities of three individuals. A lone bird flew from the broken, stepped western edge of North Plateau on 10 June 1966 and settled in a crevice on the north face of Black Rock plateau. Regurgitated pellets were found below the south end of South Plateau the next day. This bird may have remained until at least 13 July, when the fresh remains of a Common Starling were found, picked clean in precisely the same manner as were Common Diving-Petrels taken by Barn Owls at Lady Julia Percy Island (RMW pers. obs.).

On 20 and 22 August 1970 a Barn Owl was seen successively at the rear window of the field station, roosting on Black Rock, and on a tank stand beside the station. On 15 September a Barn Owl flew from a recess below the northern point of South Plateau to East Reef, pursued by Silver Gulls; later it was on Main Beach directly beneath a steel cable that guyed the observation tower, incapacitated by a broken wing. On 5 October the fresh remains of a Silver Gull, headless and stripped of flesh, were found on West Beach, indicating another owl was in residence. This was confirmed two days later when a large Barn Owl flew from a roost below the South Plateau observation hide to Black Rock, pursued by Silver Gulls.

Sacred Kingfisher *Todiramphus sanctus*

One sighting by FTB, of a lone bird on Seal Rock on 10 November 1970.

Yellow-rumped Thornbill *Acanthiza chrysorrhoa*

One record on 19 November 1967 of a lone bird hopping about mats of noon flower on South Plateau; last seen flying to Black Rock.

Yellow-faced Honeyeater *Lichenostomus chrysops*

Lone birds were recorded on 21 December 1968 and 28 October 1975. The first sighting was of the bird battling against a strong wind near the field station and the second bird was seen perched on the roof of the South Plateau observation hide. Specimen: RW#361, 21 December 1968 (Museum Victoria), female, ovary c. 5 mm in length, largest follicle 1 mm; stomach contained four tiny flower(?) buds c. 2 mm in length.

White-eared Honeyeater *Lichenostomus leucotis*

One record of a lone bird flying about the eastern cliff face of South Plateau on 16 January 1968.

Yellow-tufted Honeyeater *Lichenostomus melanops*

One record of a lone bird active about mats of noon flower near the rear of the field station on 15 May 1968. Closely observed with binoculars from a distance of about 6 m by KJC, FTB, WMB and RMW.

White-plumed Honeyeater *Lichenostomus penicillatus*

One record of a lone bird perched on the flying fox tripod, South Plateau, on 18 May 1971.

White-fronted Chat *Epthianura albifrons*

One record on 18 October 2000 on South Plateau.

Black-faced Cuckoo-shrike *Coracina novae-hollandiae*

Single sighting of a lone bird on 19 April 1972, perched on the tower guys for about an hour.

Grey Shrike-thrush *Colluricincla harmonica*

Sighted once only on South Plateau on 27 April 1966.

Dusky Woodswallow *Artamus cyanopterus*

One sighting on 26 April 1966 by WMB of a lone bird perched on a ladder beside the door of the field station at dusk. It was captured after dark, found to be fit and was released next morning.

Raven *Corvus* sp.

One record of a flock of 12 birds flying past about 50 m offshore on 26 February 1971 and heading in a southerly direction. As none vocalised, identification to species was not possible. Presumed to be the locally common Little Raven *C. mellori*.

Satin Flycatcher *Myiagra cyanoleuca*

Recorded in most years in the first survey period during calm weather. The 27 records fall into two distinct seasonal groups: late February to March and November to mid-December, with a single record on 17 May of a female on West Beach. Pairs were seen twice in November, twice in December and once in March; the 23 other sightings were of lone birds. About half the sightings were of males. These flycatchers were always observed on or near noon flower on the edges and cliff faces of the South Pla-

teau, where they actively pursued insects. This species bred at Sandy Point (14 km north-east) in December 1962, 1963 and 1964 (Davies and Reid 1975c).

Magpie-lark *Grallina cyanoleuca*

One record on 23 November 1965 of a lone bird on Black Rock.

Rufous Fantail *Rhipidura rufifrons*

Seen once by WMB, on 13 December 1970, perched on the steps of the field station. WMB noted its white throat and broadly fanned russet tail. Davis and Reid (1975c) noted this species to be a rare visitor to Sandy Point.

Grey Fantail *Rhipidura albiscapa*

All the 40 records came from the first survey period and fell into two clear seasonal groups—autumn visits (mid-March to May) of groups of up to eight birds, and spring visits (mid-August to mid-December) of individuals and, rarely, pairs. Arrivals were always associated with calm weather and the fantails' activities were restricted to mats of noon flower on the plateaux and cliff faces, where they searched for flies and small moths. Usually, they left before the weather changed for the worse.

Willie Wagtail *Rhipidura leocophrys*

Two records of lone birds, on 17 August 1969 (KJC) active on South Plateau, and from 26 to 30 May 1976 when one was 'marooned' on the islet by very strong north-westerly winds. It confined its activities to the lee side of South Plateau, mainly about the base of the cliff.

Flame Robin *Petroica phoenicea*

Eighteen sightings during autumn on seven occasions during the first survey period—in mid to late March in 1966, 1968, 1969, 1972, 1973 and 1977, and on 13 and 14 May 1969. Generally, up to seven birds were seen at any one time over a period of one to seven days, and about three in four were in drab plumage. A dramatic influx to Seal Rock occurred on 19 August 1969 when at least 18 birds were in view (11 males, 7 in drab plumage). This was apparently part of the pre-breeding migration (see Davis and Reid 1975c). Specimens RW#434 female and #435 male, collected 20 April 1966, both very fat, testis of male 1.5 mm in length (Museum Victoria).

Australian Reed-Warbler *Acrocephalus australis*

Three records of lone birds active about the cliff faces of South Plateau, on 9 January 1969, 24 November 1969 and 17 June 1970. Specimens—RW #365, 9 January 1969 and RW #48, 17 January 1970 (Museum Victoria). The latter had bright yellow subcutaneous fat associated with the major feather tracts, and cream-coloured visceral fat; testis 3.3 mm in length.

Brown Songlark *Cincloramphus cruralis*

Recorded twice on South Plateau in mid-summer, on 14 January 1969 and 17 January 1970. The first bird was feeding on small butterflies, Australian Painted Lady *Vanessa kershawi* that had appeared in considerable numbers on the previous day, apparently from Phillip Island via a steady easterly breeze. Specimen: RW#369 (Museum Victoria), 14 January 1969, testis 1.5 mm in length; stomach contents remains of *V. kershawi*, an orange ichneumon wasp *Netelia* sp. and small flies.

Silveryeye *Zosterops lateralis*

Nine sightings in the first survey period between October and May of one or two birds active about clumps of noon flower on the Seal Rocks plateaux. On two occasions, 2–4 November 1969 and 12–13 April 1973, repeated sightings may have been of the same individual or stragglers of larger groups passing through on pre- and post-breeding movements (see Davis and Reid 1975c).

Welcome Swallow *Hirundo neoxena*

A resident species, nesting in cavities and caves in the cliffs of South Plateau and Black Rock. One to two pairs seen throughout the year, usually skimming low over the upper beach slopes and plateaux. Very young nestlings were found on 2 November 1967 and 2 November 1969, and had fledged by the end of that month. Flocks of swallows were seen in December (1 × 9), January (1 × 30+), March (3 × 12+, 8, 10) and May (1 × 6).

Common Blackbird *Turdus merula*

Lone birds were sighted on Seal Rock on 21 April 1966 and 30 March 1979.

Common Starling *Sturnus vulgaris*

Small numbers bred regularly on Seal Rock,

pairs being noted as early as mid-August and nestlings being fed as late as 20 December, suggesting that several clutches were produced in a season. Only eight nests containing three to five eggs were found in well-hidden natural sites—in rock piles, in deep crevices in the cliffs, and one was behind a festoon of Ruby Saltbush on the cliff near the South Plateau observation hide; elsewhere nests were constructed in the roof ventilation shafts of the field station and in a corner of the South Plateau observation hide.

Parents actively foraged in clumps of noon flower and obtained an abundance of blowflies and their maggots from decomposing seal carcasses. Starlings were very wary of Silver Gulls, especially when gathering food in their vicinity, but on one occasion a parent defended a chick exposed to a threatening gull by landing on its back and pecking at its head.

Large flocks roosted on the cliffs overnight throughout the year, usually arriving at dusk from the direction of Phillip Island in small groups and separate compact flocks of 50–100 birds; occasionally a massed flock of 500+ birds was seen. Numbers appeared relatively similar between the two survey periods. As they approached these large flocks broke up into smaller groups which flew down at surprising speed straight onto the cliff faces. Incoming starlings were not deterred by strong winds and were often seen labouring against gale-force south-westerlies. A succession of small groups departed at or soon after dawn. Predation by a Barn Owl and a Nankeen Kestrel were noted.

Common Myna *Sturnus tristis*

A lone bird was seen on South Plateau on 25 November 1976 and a pair next day in the same vicinity.

House Sparrow *Passer domesticus*

A group of about five sparrows was seen on South Plateau near the field station on 10 June 1966, and lone birds were seen at the islet on 16 November 1966 and 16 November 1967.

Australasian Pipit *Anthus novaeseelandiae*

Six records of lone birds between mid-October and mid-April, active about the Seal Rocks plateaux and on Main Beach.

European Goldfinch *Carduelis carduelis*

Five records of 1–4 birds flying over or past

the islets, on 19 and 26 April 1966, 16 October 1968, 12 November 1968 and 26 July 1969.

Discussion

Although Seal Rocks lies a mere 1.5 km from Phillip Island, in character it is truly an island of Bass Strait. It is exposed to the full force of any gales and to the prevailing ocean swells from the south-west, which rise and break heavily around the two islets, and on occasion completely sweep the outer reefs and lower shore platforms. Powerful currents associated with the tidal flushing of Western Port contribute to turbulence of the sea to the north and east of Seal Rock. All the common Bass Strait seabirds adapted to these conditions were frequently seen in the waters adjacent to Phillip Island.

Seventy-five native and six exotic species of birds, including 21 native passerines, were observed at Seal Rocks or nearby. Six species were recorded breeding—Crested Tern, Silver Gull, Sooty Oystercatcher, Welcome Swallow, Common Starling and, for the first time in Victoria, Kelp Gull.

The variety of land birds recorded on Seal Rocks in the first survey period was surprisingly high, given the exposed nature and relative sterility of the terrain; however, the strait between Seal Rock and Phillip Island is narrow, all the species recorded there are common in the region, and most are wide-ranging seasonally or undertake significant north-south migrations. In each case the dates of sightings at Seal Rocks correspond with the timing of seasonal movements by the species concerned. Of particular interest is the clear evidence of departure and arrival of several small passerines known to migrate across Bass Strait—Satin Flycatcher, Grey Fantail and Flame Robin.

Changes over the 40-year period

There are a number of differences between the numbers and species of birds recorded in the first period of intensive observation (1966–1972) and the second period (1997–2005). Many fewer pelagic seabirds, Pacific Gulls and land birds were recorded in the second period and there were substantial changes in the numbers of breeding Crested Terns, Silver Gulls and Kelp Gulls. A comparison of the abundance and diversity of pelagic seabirds between the two periods is invalid as observations were not

made out to sea in the second period and hence relatively few seabirds were recorded. The preponderance of sightings of passerines and other land birds on South Plateau was no doubt a reflection of the activities centred on the field station there, which had the effect of deterring visits by seals, but may also have been related to the more extensive growth of noon flower on the plateau and its cliffs than elsewhere and the better shelter provided on its eastern face. With the removal of the field station on South Plateau in 1979, came much greater fur seal activity there and consequent destruction of noon flower areas on the top of the plateau. After 1997, vegetation was limited to a few sites inaccessible to seals on the sides of the plateau. This, together with the fact that the length of visits was substantially shorter in the second survey period meant that relatively few passerines were recorded there in later years.

The main changes to the breeding bird populations have been the movement and expansion of the breeding colonies of Crested Terns and Silver Gulls to adjacent parts of nearby Phillip Island and the arrival and expansion of the breeding Kelp Gull population. Crested Terns no longer breed on Seal Rocks; they have increased enormously in number locally and approximately 4000 birds breed on the Little Nobby (2 km east) (Chiaradia *et al.* 2002). The number of breeding Silver Gulls on Seal Rocks has decreased significantly over the past 40 years. Since the early 1980s there has been a consolidation of most of the Silver Gull colonies on the western end of Phillip Island to the two islets that make up 'The Nobbies' and the adjoining area of Point Grant. Disturbance from the increasing number of seals and Kelp Gulls may have been factors in both of these species moving from Seal Rocks and the subsequent increase may have been encouraged by the progressive elimination of foxes *Vulpes vulpes* in the western half of Phillip Island.

Kelp Gulls have also increased substantially at Seal Rocks since their arrival in 1968. Approximately 80 birds now breed there and they have successfully colonised a number of sites on nearby Phillip Island (Dann 2007) and on Lady Julia Percy Island (Dann *et al.* 2004). The expansion of Kelp Gulls at Seal Rocks may have

been associated with the expansion of fur seal numbers which, on one hand has reduced the number of suitable breeding sites, but on the other hand has increased the amount of food available in the forms of vomited food remains and placentae. In regard to the latter, the aggregate mass of placentae produced during the November–December pupping season would be at least 2000 kg and this represents an important source of high-quality protein for the gulls. However, many placentae are left unscavenged during the peak period of pupping, apparently because supply far exceeds demand. On the other hand, retching seals are always eagerly and competitively attended by gulls, and any ejected food items immediately snatched up by one or other of the three species of gull that occur on the islets.

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Note

¹ Fred Baum (FTB), 1965–1979; Kevin Chipperfield (KJC), 1965–1970; Bill Bren (WMB), 1967–1973; Keith Cherry, 1970–1979; and Steve Craig, 1973–1977.

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One Hundred Years Ago

Excursion to Phillip Island

BY JOSEPH GABRIEL

I am indebted to my co-leader, Dr. Brooke Nicholls, for the following notes on the bird-life of the outing. He says: — “As the result of several trips to Phillip Island just sixty species of birds have been recorded, but of these sixteen are sea or shore birds, leaving forty-four as residents of the island. These correspond very closely with the total of thirty-six species recorded in the *Naturalist* of December, 1911 (xxviii, p. 149), for the Bass Valley by Mr. A. W. Milligan and myself at Easter, 1911. The Bass Valley, it may be mentioned, is situated on the eastern side of Western Port, and at no great distance from Phillip Island. However, as each of our visits to the island and to the Bass Valley was made during the Easter holidays, observations at other periods of the year would doubtless add to the lists. The absence of the Spotted Ground-bird, *Cinclosoma punctatum*, Lath., from the Phillip Island list, and its inclusion in that of the Bass Valley, is perhaps the most interesting result of the comparison, and, while this bird has not yet been recorded for the islands of Bass Strait, it occurs in Tasmania. The presence of the Emu-Wren, *Stipiturus malachurus*, Shaw, the Orange-tipped Pardalote, *Pardalotus assimilis*, Ramsay, and the Mistletoe-bird, *Dicaeum hirundinaceum*, Shaw, upon the island is also of interest. Of the sea-birds found upon the island, the Short-tailed Petrel, or “Mutton-bird,” *Puffinus brevicaudus*, Gld., and the Little Penguin, *Eudyptula minor*, Forst., bulk largest in importance. Both these birds are diminishing in numbers every year, and their rookeries are being gradually thinned out. It will be a surprise to many members of the Club to learn that the penguin is not upon the list of birds protected for some portion of the year. As Phillip Island is practically the last stronghold near the mainland of the Mutton-bird and the penguin, it is time they were afforded full protection in this locality. During the excursion some interesting observations were recorded regarding the penguins. The accompanying plate shows the nest of a pair of these birds, containing a young bird. The nest was some 500 yards inland from the sea, and placed high upon the cliff, amongst the tussocks. There were two openings to the burrow, which is unusual. In the foreground of the picture will be seen numbers of feathers scattered in front of the young bird. These are the shed feathers of the *second* down stage. During recent years it has been found that many birds, especially penguins and petrels, shed two stages of down prior to acquiring the adult plumage. In the penguin the first down is of a fine, silky, hair-like structure. The young bird in the photograph had donned the adult plumage, which is attained prior to its leaving the nest and entering the sea.”

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